AD-A170 835 VOICE SYNTHESIZATION AS A TOOL TO ENHANCE REVISION DURING THE WRITING PROCESS(U) ARMY MILITARY PERSONNEL CENTER ALEXANDRIA VA W P HOWLETT 26 JUL 86 1/2

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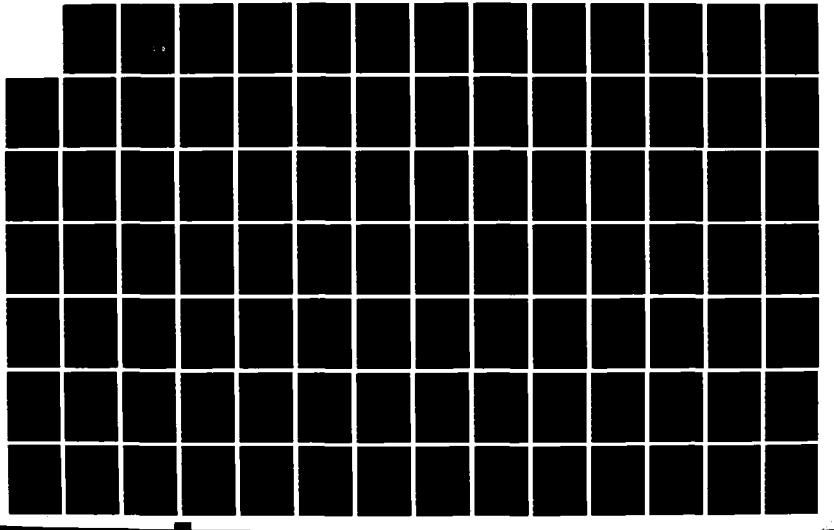

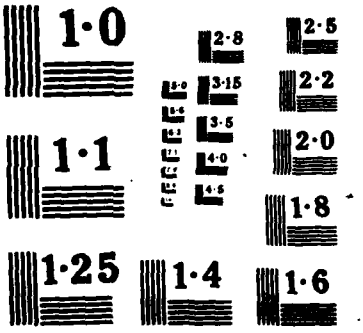
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Voice synthesization as a tool to enhance revision during the writing process

by

William Peter Howlett

A Thesis Submitted to the
Graduate Faculty in Partial Fulfillment of the
Requirements for the Degree of
MASTER OF SCIENCE

Department: Professional Studies in Education
Major: Education (Curriculum and Instructional Technology)

Approved:

In Charge of Major Work

For the Major Department

For the Graduate College

Iowa State University
Ames, Iowa

1986

AD-A170 835

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Voice synthesization as a tool to enhance revision during the writing process

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Final Report - 28 JULY 1986

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A thesis submitted to Iowa State University, Ames, Iowa in partial fulfillment of the requirements for the degree of Master of Science.

SECURITY CLASSIFICATION OF THIS PAGE *(When Data Entered)*

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER	2. GOVT ACCESSION NO. AD-A170 835	3. RECIPIENT'S CATALOG NUMBER
4. TITLE *(and Subtitle)* Voice synthesization as a tool to enhance revision during the writing process		5. TYPE OF REPORT & PERIOD COVERED Final Report 23Jul86
		6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) William Peter Howlett, LT, AGC		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS Student, HQDA, MILPERCEN (DAPC-OPA-E), 200 Stovall St, Alexandria, VA 22332		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS HQDA, MILPERCEN, ATTN: DAPC-OPA-E, 200 Stovall St, Alexandria, VA 22332		12. REPORT DATE 28JUL86
		13. NUMBER OF PAGES 101
14. MONITORING AGENCY NAME & ADDRESS *(if different from Controlling Office)*		15. SECURITY CLASS. *(of this report)* Unclassified
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT *(of this Report)*

Approved for public release; distribution unlimited

17. DISTRIBUTION STATEMENT *(of the abstract entered in Block 20, if different from Report)*

18. SUPPLEMENTARY NOTES

Thesis (MS), Instructional Technology, Iowa State University

19. KEY WORDS *(Continue on reverse side if necessary and identify by block number)*

Voice synthesizer, artificial voice, word processing, writing, revision

20. ABSTRACT *(Continue on reverse side if necessary and identify by block number)*

Relatively inexpensive computer programs combining a word processor with a voice synthesizer are becoming available. The companies producing these programs are making claims that the use of a voice synthesizer during the revision stage of the writing process will improve the writing product. This study examined the differences between the writing products of a group using a voice synthesizer word processor and a group using only a word processor. Analysis of the data collected indicates a

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CHAPTER I: INTRODUCTION

Concern about the general skills possessed by students emerging from our educational system prompted the National Commission of Excellence in Education to produce the widely read report, A Nation at Risk (Goldberg, 1984). This report stressed the importance of education for a secure and stable future for the country, as well as stating that there was presently too much mediocrity in our nation's school system. The picture painted by the report was not one of total mediocrity however, the commission found numerous examples of dedicated teachers responding admirably to the problems in education (Brandt, 1984).

These dedicated educators over the recent years, have been placing more of an emphasis on teaching the basic skills. This increased emphasis has lead to an improvement in standardized test scores and lower order arithmetic skills. Despite the efforts of these teachers, however, the quality of writing instruction remains extremely low.

The 1984 National Assessment of Educational Progress study of student writing indicated that, despite a steady upward trend, the writing proficiency of American students is far below that which is necessary to effectively cope with the increased amounts of information available in this technological age (Solorzano, Collins, Galligan, Hawkins, & Peterson, 1986). Writing instructors must now act as a reading

audience for hundreds of additional writing assignments. Add to this an increased emphasis on reading and arithmetic as well, and writing instruction must compete for the time left in an already crowded curriculum with all the other subjects offered in school (Shostak, 1984).

Impact Upon the U.S. Army

The recent decline in the writing skills of high school and college graduates is particularly evident in the United States Army (Cavanaugh, 1985). The Army views writing as a communicative act, involving both a reader and a writer, as well as the written word (Bruce, Collins, Rubin, & Gentner, 1978). Communication skills, both oral and written, are essential to the operational effectiveness of the Army. One would expect that a breakdown in the wartime Army communication process due to unclearly written instructions would have disastrous results. What is not so clear is the importance of good writing skills in the daily operation of the Army during peacetime.

A poorly written personnel evaluation form can stagnate the career of a truly deserving individual. Confusion resulting from poorly written orders can waste an exorbitant amount of funds and manpower hours. In an attempt to improve the writing skills of its personnel, the United States Army has implemented a writing program throughout the Training and

Indoctrination Command (TRADOC) school system (Cavanaugh, 1985). The intention of this program is not to turn all of its personnel into authors of great reknown, but rather to improve their basic written communication skills (Morrissette, 1985).

The Army's writing program is currently of the traditional paper and pencil variety. The same problems that plague school systems will also plague the Army's program: a single instructor will have to act as an audience for hundreds of writers. The writing program will also have to compete for time in an already crowded Army curriculum. The use of microcomputer based word processors, grammar checkers, spelling checkers, and microcomputer generated pre-writing activity packages can becoming an increasingly viable alternative to traditional writing instruction in the Army's curriculum (Shostak, 1984).

Writing With Word Processors

Computer software packages have been developed to hone a writer's skill in each of the four steps of the writing process: pre-writing, composing, revising, and editing (Shostak, 1984). Word processors are becoming an integral part of these writing instruction packages, as well as becoming the primary motivator for many personal computer owners in making their initial hardware investment (Case & Daley, 1983). Research indicates that the use of word processors positively affects the writer's attitude toward writing. This improved

attitude has been attributed to the fact that word processing not only facilitates the collection of text, but also removes the drudgery in revising and editing collected text (Hunter, 1983). In relatively the same amount of time necessary for producing a rough draft using pen and paper, a professional looking document can be produced using a word processor.

The word processor, normally associated with the business world, has been termed "tool software " when used in instruction (Sheingold, Hawkins, & Kurland, 1984). "Tool" software is an extremely cost effective educational use of the computer, as one program can be used in a variety of situations. With creativity and careful planning, not only can a word processing system be used in teaching writing, proper formatting of correspondence, and other language arts related material: but it can be used in teaching military history, mathematics, and physics as well. This idea of "generic" programs is especially intriguing to the Army, as it has the potential of drastically reducing training costs (Lawson, 1984).

Developing a Sense of Audience Awareness

The utilization of word processing can assist in both the collection and subsequent revision of written material. A closer look at the writing process as a communicative act, however, indicates yet another common problem area where basic writers may be assisted by technology. Writers having a great

problem in divorcing themselves from the text and developing a sense of audience awareness may find relief in this new computer age (Kroll, 1981).

Researchers in this area have attempted to develop a sense of audience awareness in poor writers by having the student record their completed work on the tape recorder. The student played back the recording and became the "audience" (Hawkinson, 1965). The results of this study were inconclusive: hearing their written work had no significant effect on the revision process. This lack of significance was attributed to the fact that the student could neither easily edit the tape nor the document.

A Possible Solution

The use of a computerized voice synthesizer could be the logical next step in this type of research. The utilization of voice synthesizers is just beginning in special areas. Voice synthesizers have been successfully used in teaching writing to the blind (Vincent, 1981). The U.S. Navy has used them to teach basic reading skills and believe that their use deserves further study (Wisher, 1980).

The writer's awareness of the reader's comprehension of the intended meaning is the key element of writing as a communicative act (Collins, 1981). Voice synthesizers emphasize the meaning of the message rather than the grammar. The writer's attention can be focused on the clarity of the

ideas expressed, rather than worrying about grammatical errors. Instead of providing the reader with a grammatically error free paper at the cost of meaning, the writer can ensure that the meaning of the paper is apparent to the reader.

It would seem that the pairing of a voice synthesizer and a word processor would be ideal for increasing the writer's audience awareness. First Byte's "SmoothTalker" program for the Macintosh microcomputer provides just such a combination (Casey, 1985). Combining a word processor with a simple to use voice synthesizer affords the user the opportunity to compose a document, listen to it as an audience would, make on the spot revisions, and almost immediately listen to the revised document. This would be a great improvement over the tape recorder technique used by Hawkinson (1965).

A Cautionary Note

Recent research in the area of audience awareness, however, emphasizes an additional step in the remedial revision process. Not only should students reread their document, aloud or to themselves, but they should also receive feedback from an audience who is not a specialist in the topic area (Collins, 1982). The audience's unfamiliarity with the topic ensures that their feedback is a true indication of the clarity of the presented material. The basic writer often writes as he/she speaks (Collins, 1981), that is, he/she does not take into account the experiential background of the audience. In

speaking, one can clarify points in response to verbal and non-verbal feedback. Immediate feedback from an audience does not exist in written communication as it does in verbal. In writing, one must ensure that the information presented is elaborate enough to be understood by a general audience (Cayer & Sacks, 1979).

This development of a sense of audience awareness is not related to writing only. Microteaching is an attempt to develop this sense in teacher education majors. Microteaching allows pre-service teachers to view their own teaching skills and compare them with others. This is accomplished by having 3 to 10 student teachers prepare mini-lessons lasting between 5 to 20 minutes. The student teachers then present their lessons to the group while being videotaped (Mayhew, 1982). Although the importance of the student being able to view himself/herself in action is undeniable, it is equally important to have a skilled observer critique the performance and discuss this critique with the student (Zifrund, 1981).

"SmoothTalker" is capable of reading students' words back to them, but can neither critique nor question the clarity of what is written. Casey's (1985) statement that this program aids adults in editing written materials must be looked at carefully in light of First Byte Incorporated's intention of developing compatible packages for a variety of computers (Jacks, 1985). The accessibility of low cost voice synthesizers requiring no additional hardware would probably

mean that these packages would very likely find their way into school, industry, and military training programs. It is imperative that the claims of the manufacturers be verified to ensure proper utilization of this technology.

Summary

In response to a decline in the basic writing skills of personnel, the Army has implemented a new writing program in all Army service schools. Although the present program makes little use of the computer, this would appear to be an area where the computer might be most useful. There are currently many computer programs available to assist the writer in the four steps of the writing process. The most promising use of the computer in teaching writing, however, is the use of the word processor during the composing stage (Shostak, 1984).

The Army views writing as an act of communication, with the delivery of a message that is understood by the target audience as the primary goal. To ensure that the message is clear and understandable, the writer must put himself/herself in the place of the reader. Early attempts to teach the beginning writer to think of the text from the reader's perspective involved the use of a tape recorder, an extremely time consuming process.

The "SmoothTalker" program, available for the Macintosh, combines a voice synthesizer and an easy to use word processor. First Byte's instructional designer, Dr. Jean Casey (1984)

believes that this package will aid adults in editing written documents. Current research, however, indicates that the writer needs to be critiqued by a generalized audience, in addition to rereading his/her document.

The possible introduction of this technology in the near future to education, industry, and the military clearly points to a need for further research in the area of teaching writing skills and voice synthesization.

Statement of the Problem

Relatively inexpensive programs combining a word processor with a voice synthesizer are becoming increasingly available. The companies producing these programs are making claims that the use of a voice synthesizer during the revision stage of the writing process will improve the writing product. Current research, however, indicates that the use of the voice synthesizer alone may not be enough to significantly improve the writing product. Therefore, the effectiveness of a voice synthesizer as a tool to enhance revision during the writing process must be examined.

The implementation of these software packages into schools, industry, and the military may have an effect on the writing of a diverse population. The effect of the voice synthesizer on subjects of varying academic achievement, as measured by G.P.A., must also be examined.

Finally, subjects using a voice synthesizer/word processor software package should spend more time on the computer than subjects using a word processor alone. The effect of this additional computer time on the writing product should be examined.

Purpose of the Study

The proponents of the computer software program "SmoothTalker" claim that utilizing the combination of a word processor and voice synthesizer during the revision stage of the writing process will improve the quality of the written work. This study is an attempt to provide empirical evidence that either supports or refutes this claim.

This study will also examine the effects of a voice synthesizer on subjects of varying academic achievement, as measured by G.P.A. Both the amount of time the control and experimental group actually spends working on the computer and any effect that this may have on the writing product will be examined as well.

Statement of the Hypotheses

Null Hypothesis 1: There will be no significant difference in the writing product between the experimental and control group after using Smoothtalker during the revision step of the writing process.

Alternate Hypothesis 1: There will be a significant difference in the writing product of the experimental group after using Smoothtalker during the revision step of the writing process.

Null Hypothesis 2: There will be no significant interaction effect between the subjects' academic achievement, as measured by G.P.A., and treatment group on the quality of their writing products, as measured by the independent scorers.

Alternate Hypothesis 2: There will be a significant interaction effect between the subjects' academic achievement, as measured by G.P.A., and treatment group on the quality of their writing products, as measured by the independent scores.

Null Hypothesis 3: There will be no significant correlation between the amount of time the subjects' spend working on the computer and the quality of their writing products, as measured by the independent scorers.

Alternate Hypothesis 3: There will be a significant correlation between the amount of time the subjects' spend working on the computer and the quality of their writing products, as measured by the independent scorers.

Assumption

The quality of the speech of "SmoothTalker", although vastly improved, is not as clear as digitized or normal speech.

Research, however, indicates that the quality of the speech of voice synthesizers does not negatively affect the user (Vincent, 1981). Therefore, it is assumed that the quality of speech of "SmoothTalker" will not significantly affect the results of this study.

Definition of Terms

Advanced Camp:	Military training that cadets in the Army Reserve Officer Training Corps attend during the Summer prior to their senior year in college. Successful completion of this training qualifies them for entry into the U.S. Army.
A.R.O.T.C.:	Army Reserve Officer Training Corps, prepares young men and women for entry into the U.S Army, Army Reserve, and National Guard as officers.
Biography:	A document of 250 - 300 words that lists the historical data of the subject that would be of the most interest

to a reader of a hometown newspaper.

Lower G.P.A. Group: Subjects with a G.P.A. score below the 50th percentile.

Macintosh: A 32 bit Apple brand microcomputer with a 3.5" disk drive.

MSIII: Military Science, Third Year. A.R.O.T.C. cadets in their junior year of college and/or training. These cadets are in final preparation to attend Advanced Camp.

SmoothTalker: A voice synthesizer/word processing software package available for use on the Macintosh microcomputer.

Treatment: The SmoothTalker voice synthesizer/word processing software package.

Upper G.P.A. Group: Subjects with a G.P.A. score above the 50th percentile.

Voice Synthesizer: The generation of speech by a computer.

Word Processing: The use of electronic equipment to create, modify, and print written material.

CHAPTER II: REVIEW OF THE LITERATURE

In this chapter, a review of the recent literature in relevant areas of writing instruction is presented. This chapter includes a discussion of writing as a process, followed by a discussion of the writing process as an act of communication. Since communication implies that there must be a sender and a receiver, a brief discourse is presented on developing a sense of audience awareness in the beginning writer. The audience awareness section is followed by sections devoted to the integration of computers into writing instruction, with an emphasis in the use of the word processor. The relationship of speech and writing is also examined closely, followed by recent research in the area of artificial speech, commonly referred to as voice synthesization.

The Process of Writing

Writing is viewed as an ongoing process that can be separated into four stages (Shostak, 1984). These stages are not steps that are performed sequentially, but rather are worked through at different periods of the writing process in an order determined by the writer.

Prewriting is the first stage of the writing process. The writer collects his/her thoughts about the subject he/she intends to write about. The writer also gives

considerable consideration to the flow of the intended text, possibly generating a formal or informal outline.

The second stage is considered to be the actual writing of a rough draft of the intended text. Using the formal or informal outline and thoughts that were collected in the prewriting stage, the writer begins to form the body of the text.

The third stage is revision: the manipulation, addition, and deletion of text to facilitate the communication of a clear message to the intended reader. Once the rough form of the text begins to develop, the writer can enter and exit stage three, revision, at will. The writer may choose to complete the rough draft first, or only portions of it, and then go back and make changes to assist the flow of information.

Stage four, editing, is inter-related with stage three. During stage four, the writer is more concerned with the mechanics of writing (spelling, grammar, syntax) than the flow of the information. Many times a writer will write, edit, and revise a document concurrently. That is, rather than typing the whole document first, then going back to smooth any rough areas, and then checking the document for spelling and grammatical correctness, the writer will make changes in the text and correct spelling and grammar while composing. It is this lack of a linear

procedure with well-defined steps that makes writing a process (Sommers, 1982).

Very often beginning writers will work through the the first and second stages, write their initial draft and view it as a finished product. Little do they realize that revision is the key to a smooth flowing document. The more a writer reflects on his/her own thinking, the better the revisions (Buechler, 1983).

In the past, writing instructors attempting to emphasize the importance of revision to beginning writers, used grades as a motivating factor. Using grades as a motivating factor, while successful for better writers, did not prove to be an effective technique to encourage poor writers to revise (Pavlisin, 1983). The poorer writers found revision to be tedious and viewed formal revision as a form of punishment. They spent more than 70% of their writing time concentrating on the topic of the initial text, while the better writers spent 60% of their writing time revising their text to be read by a particular audience (Monahan, 1982).

The better writers realized that they were writing to a target audience. The act of writing to them was more than merely putting words on paper, it was an attempt on their part to transmit their ideas to others. They were in fact focusing on the communicative nature of writing.

Writing As Communication

Writing is also viewed as an act of communication by commanders of the U.S. Army (Morrissette, 1985). General George R. Stephens recognized as early as 1960 that an Army officer must be able to communicate with physicists, scientists, historians, social scientists, and a variety of other professionals.

Like writing, communication is an ongoing process. An excellent model of this process is the Simonson and Volker (1984) model of communication, Figure 1.

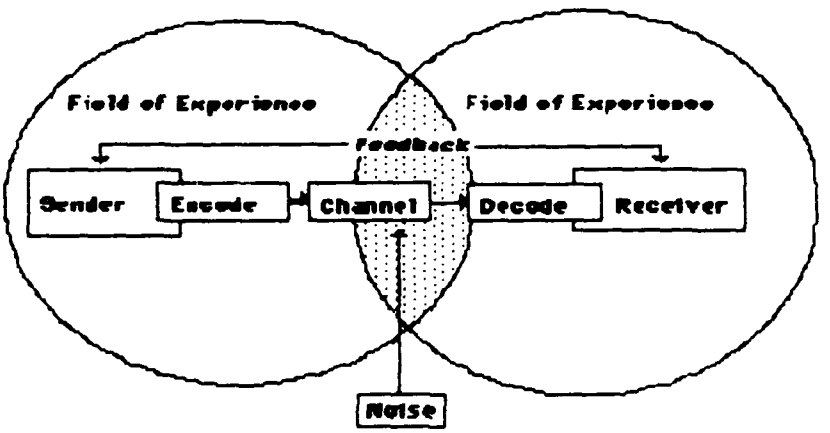

Figure 1. Communication Model

There are three essential elements to any communication, an idea or message to be transmitted, a sender of the message, and someone to receive it. The sender must encode the idea or message for transmission. This encoding can be as simple as writing down an idea, or as

complicated as devising a secret code to prevent people other than the target audience from understanding the message. After encoding, the sender transmits the message to the receiver over some channel, such as written correspondence, radio, or simply speaking. Anything that interferes with the transmission of a message, such as blurry print or static, is called noise (Simonson & Volker, 1984).

Both the sender and receiver have experiential backgrounds (fields of experience) that are unique to them. The amount of overlap between the sender and receiver's fields of experience determine, to a great extent, the success of the communication. If the sender operated from outside the shared fields of experience, the receiver would not be able to decode or understand the message. A sender fluent in Spanish and English and a receiver fluent in French and English would prove to be a very good example of this. The shared field of experience for both is the English language. If the sender encoded his/her message in Spanish, the receiver would have a difficult time decoding it. Errors may appear in the decoding due to the similiarity between Spanish and French.

The receiver would somehow have to inform the sender that the message was unclear. This concept of feedback is

what makes communication a process. The amount of feedback is determined by the channel selected for transmission. During a conversation, feedback is plentiful. The receiver can inform the sender of unclarity by facial expressions, body position, or simply interrupting with a question. In this case the feedback can be immediate. In comparison, written communication can experience much longer delays in feedback.

Figure 2 is an adaptation of the Simonson and Volker (1984) communication model that may best illustrate writing as a communicative act.

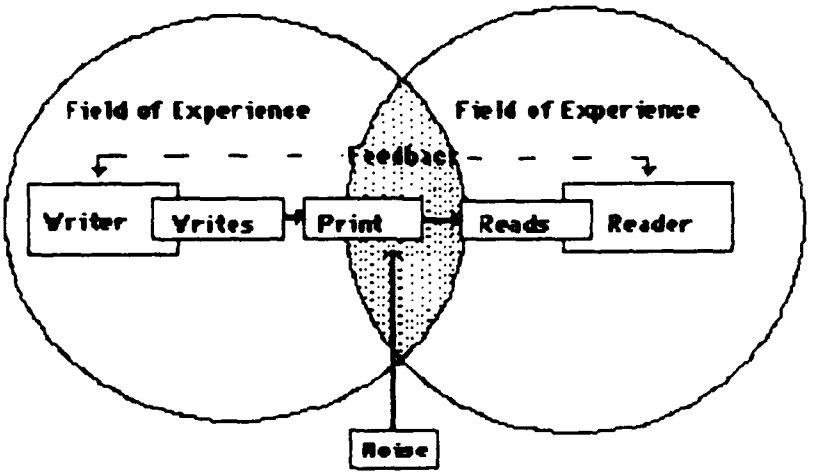

Figure 2: Writing as Communication Model

The writer, drawing on his/her field of experience or background knowledge, writes with the intended audience in mind. The reader reads what was written and interprets it using his/her own field of experience. If the fields of

experience of both the writer and reader do not overlap, the reader will not fully understand the text. This effect is called noise or interference. The greater the amount of noise that exists, the less likely that the communication will be successful. Unlike verbal communication, there is very little opportunity for immediate feedback in writing. It is therefore essential that the writer take a more active role and review his/her written work as if he/she was the intended audience. Any information being transmitted that is not within the shared field of experience between the reader and writer must be explained to a greater degree and in terms that exist within the reader's field of experience (Bertram, Collins, Rubin, & Gentner, 1978).

Officials in the Army are more concerned that the message is received and understood by the reader, than they are about grammatical correctness (Morrissette, 1985). Research indicates that the writer can achieve a high level of writing proficiency by stressing ideas and sound, rather than proper grammar and spelling. If a student focuses primarily upon ensuring that the paper is grammatically correct, the content will suffer and the communication be unsuccessful. The writing process becomes an exercise froth with frustration and failure, while the communication fails as the writer loses sight of

the intended audience, the reader (Montag, Alt, & Rosenbalm, 1969).

Audience Awareness

During the prewriting stage of the writing process the writer must identify the type of audience that the document is intended for. Once the audience is identified, the writer must then tailor his/her composition to meet the needs of that audience. Writers who modify their writings according to their audience demonstrate audience awareness (Kroll, 1980).

To fully develop a sense of audience awareness, the writer must have had experiences being a reader. These experiences allow the writer to appreciate the position of the intended audience (Barritt, 1981). In an attempt to emphasize the reader/writer connection, writing teachers have instructed their students to read their textual documents aloud during and after composing (Hawkinson, 1965).

There are some drawbacks to having students read their compositions aloud, however. There must be at least one other student present to provide feedback to a writer reading his/her finished composition aloud. The reader of his/her composition is more involved in the act of reading than the comprehension of what is being read and therefore

cannot make effective revisions reading aloud to himself/herself. Tape recorders have been used to alleviate both of these problems (Tovatt, 1965).

Tovatt (1965) required his teenage students to use tape recorders during and after composing. After a brief period of familiarization, the students were able to discern errors in their own compositions that would affect their readability. These type of errors were not detected by the writers prior to the use of tape recorders. These tape recorders could be used at the convenience of the writers and therefore afforded the writer more flexibility. This was but one example of existing technology extending traditional writing instruction to new horizons. These horizons will continue to expand as new technologies develop and are integrated into the curriculum.

Computers and Writing Instructions

Computers are the newest technology to be integrated into the writing curriculum. One computer application, word processing, is having a particularly profound affect on writing and writing instruction.

Word processing

Word processors have been called the magical typewriter (Boudrot, 1985). Using a word processor a

student can easily collect, manipulate, add, and delete text. As the student makes changes on the computer, the document is automatically reformatted. If the computer is attached to a printer, the writer can obtain a printed copy of his/her composition. Once the document has been saved to a microcomputer floppy disk, the writer can update it later or incorporate portions of it in other documents (Geoffrion, 1983).

The editing features characteristic of word processors are a most helpful tool for beginning and advanced writers. In a study conducted at St. Olaf College, paragraph addition, deletion, and change were made as frequently as word and sentence revisions (Hunter, 1983). These features allow the writer a greater freedom to improve his/her work than available with the traditional pen and paper method.

The editing features also remove the drudgery often associated with revision, as well as removing the feeling of punishment discussed earlier. By manipulating words on a screen, the writer becomes familiar with the manipulative quality of written language. These features are a great help in creative writing activities, general writing instruction, and sentence combining activities.

Editing on a word processor contrasts greatly with the traditional pen and paper approach. Pen and paper

writing is a much more static endeavor than word processing. Students composing on the word processor tend to feel more like they are speaking than writing. When we speak, we often pay more attention to the content of what we are saying than the grammatical correctness. The message is of the utmost importance and a speaker can very easily effect changes in the message to accommodate the audience. Using a word processor, a writer can read the text from the audience's point of view and also effect changes to assist in the transmission of a clear message (Daiute, 1983).

These benefits of the word processor have not gone unnoticed outside of education circles. Despite computer companies heavily advertising the financial management and database applications of the personal computer, a survey has indicated that the primary reason most people buy their personal computer is for word processing (Case & Daley, 1983). Word processors have become so simple to learn and use that most individuals can learn basic word processing skills quickly with limited practice. This affords them the opportunity to take advantage of the great motivational value of the word processor (Kurth & Stromberg, 1984).

It is important to recognize, however, that the word processor has some limitations. The computer monitor can

only show portions of a writer's document at one time. The writer must scroll down line by line to read the document in its entirety. This limitation tends to detract from the flow and impression of an overall coherence in the document. The writer may view his/her composition as a series of sections, working on the content of individual sections rather than the transitions between sections (Dalute, 1983).

Besides disrupting the continuity of the composition, the word processor's screen display can have a negative impact upon editing. Text on a computer screen is more difficult to read than the printed word. Add to this the aforementioned disruption in the continuity of the document and the beginning writer can very often overlook mistakes in the document on the screen that he/she will notice in the printed copy. It is therefore essential that writers using a word processor have adequate access to a printer.

Despite these limitations, the word processor represents an exciting innovation for writing instruction when integrated into the curriculum with care. Early writing instruction software packages were limited in that the themes and short passages generated by the student had to be retyped on a commercially available word processor before they could be revised and expanded upon. The incorporation of a word processor into these software

packages would combine the advantages of the tutorial and evaluation capabilities of the computer with the editing and revision capabilities of the word processor, producing a more powerful instructional system (Wresch, 1984).

Writing instructional software

Computer assisted instructional software is now being developed jointly by writing teachers and computer experts for all four stages of the writing process that incorporate elements of word processing (Petersen, Selfe, & Wahlstrom, 1983).

One program designed for the first stage of the writing program, prewriting, is "Aristotle". "Aristotle", a computer program designed by Major Hugh Burns (1984), engages the beginning writer in Socratic-type conversation to assist in the formation of ideas. "Aristotle" forces the user to think on his/her own.

The U.S. Navy developed a program that assists the user in sentence and paragraph revisions. The program gives the writer experience in revising at the sentence and paragraph level, with remediation and instruction available to guide the user through to a successful conclusion (Shostak, 1984).

Grammar and spelling checkers have been developed that analyze a student's writing and provide immediate

feedback to the student. This feedback is designed to assist the writer during editing by providing a more indepth analysis than would usually be provided by a teacher (Johnson & Sterkel, 1984).

The computer has been used in innovative ways to aid during the composing stage of the writing process. Writers have been instructed to write with their monitors turned off (Marcus & Blau, 1983). Invisible writing forced the writers to concentrate on what they were typing, as they only had their memory to assist them in ensuring that what they had written flowed smoothly into what was going to be written. The writers did not worry about spelling, punctuation, and grammar errors while composing as they could not view what they had typed until they were finished. Not only did this help to allow the writer to concentrate on content and flow, but assisted in reinforcing the importance of revision and editing as well.

Invisible writing was carried a step further by Thompson and Jarchow (1984) during their experiment with computer assisted dual mode writing. In this experiment, students wrote on a computer terminal that was connected to another student's monitor. As in invisible writing, the student was unable to view what he/she was typing. The main difference in this approach was that the

receiving student could provide assistance via his/her own terminal if the writer encountered any difficulty. This reinforced the the concept of writing as a communicative act by providing the immediate feedback that occurs in the spoken language, but is seldom seen in the written language.

It is important to note, however, that a word processor cannot teach by itself. Neither can word processors or writing instructional software evaluate the quality of the writing (Piper, 1983). For these important tasks a teacher is required.

Speak/Write Relationship

It is clear to writing instructors that they must intervene in the writing process to ensure growth on the part of the beginning writer (Morrissey, 1983). How they intervene has seen some changes over the years. We are in an age typified by the mass media. Students are bombarded, not by the written word, but rather the spoken one. Oral language has become vital to thinking, reading, and writing (Monaster, 1971).

Research indicates that poorer writers depend upon the semantics of spoken language, because of this the writing instructor should be familiar with the research on the links between written and spoken language. Until

these poorer writers become proficient by internalizing the more formal rules of written language, the interaction of talking and writing can be used as a developmental tool by their writing instructors (Collins, 1981).

As previously mentioned, beginning writers are encouraged to read their work aloud. They should receive feedback from others, preferably those who are not familiar with the subject matter. This forces the writers to compose with a general audience in mind (Collins, 1982). Care must be taken that these beginning writers learn the more formal rules of the written language. The written language does not allow for the immediate feedback available in spoken language, so poorer writers tend to be less explicit in their presentation of information (Cayer & Sacks, 1979).

Once again the importance of writing as a comunicative act and the creating of a sense of audience awareness in the beginning writer must be stressed. Writing and speaking can be looked upon as complementary to each other in the communication process. The beginning writer must be able to identify the differences between speaking and writing and the situations where one is more preferable to the other (Schafer, 1981).

It is extremely helpful for beginning writers to place themselves in the position of the reader and orally

ask themselves how they can make their document more understandable. Business people for years have been using specialized tape recorders, called dictaphones, to orally compose correspondence, listen to what they have composed, and revise the correspondence until the message being transmitted is clear (Payne, 1981). This is extremely effective if the writer is proficient in the use of a dictaphone. Most schools do not have access to dictaphones and must rely on standard cassette tape recorders. Editing and revising a cassette tape can be a time consuming endeavor that may produce more frustration than the actual act of writing for the poorer writer. Yet another drawback to using tape recorders during the writing process is that after the tape has been edited and revised, the text must transcribed into writing. This may add a prohibitive amount of time to the writing process (Snipes, 1973). A process combining the oral and written aspects of this type of composing would appear to be ideal.

Voice Synthesizers

An area of development that may provide that combination of speaking and writing is artificial speech, or more specifically, voice synthesization. Voice synthesizers are simply the generation of speech by a

computer. The writer inputs the text via a peripheral device, such as a keyboard or optical scanner, and the computer reads the text aloud (Casey, 1985).

The U.S. Navy has used voice synthesizers to assist sailors in strengthening their reading skills. In an exploratory research project in 1980, the Navy found that the performance of sailors using the voice synthesizer was as good or better than sailors using the Navy's traditional reading program (Wisher, 1980). The Navy is currently conducting further research into possible applications of voice synthesizers in training.

Voice synthesizers have been used by the blind in writing instruction in England by Vincent (1981). The system used was an older voice synthesizer that slightly distorted the sound of the words and was a bit difficult to use. Despite these drawbacks, however, the voice synthesizer proved to be a useful tool in assisting the blind to write.

Newer voice synthesizers have been developed that have improved quality of speech production and are easier to use. A software package, "SmoothTalker", has been developed that is available for the Macintosh microcomputer. This software packages combines a word processor with a voice synthesizer and allows written text to be collected, read aloud by the computer, revised, and

printed. "SmoothTalker", has been used to help young students read and write (Casey, 1984). The voice synthesizer/word processing package has been found to possess great motivational value and holds great promise for the future.

Versions of "SmoothTalker" are now available for the Macintosh microcomputer that have been designed for differing age groups. The power of the voice synthesizer is now accessible by a wide and divergent group of people. The accessiblity of "SmoothTalker", and therefore the voice synthesizer, will increase as research and development efforts reach fruition and the software package is compatible with a wider range of microcomputers (Jacks, 1985).

Summary

The writing skills of our nation's students remain extremely low despite the efforts of writing instructors. The integration of technology into the writing curriculum is an attempt improve these skills.

Writing can be defined as a four stage process, prewriting, composing, revising, and editing. Rather than working through the stages in a linear fashion, the writer usually works through them in a order unique to the particular writer. This process can be viewed as a

communicative act, with the writer writing for an intended receiver or audience. The ability to mold one's composition to meet the needs of the intended audience is called audience awareness and is a vital skill to possess to ensure successful communication.

In the past, technology in the form of tape recorders has been used to increase the writer's sense of audience awareness. The development of new technology, most notably the computer, presents writing instructors with new and exciting possiblities of adapting instruction to meet the individual needs of their students.

One of the most promising applications of the computer is word processing. Word processing is the collection, manipulation, and revision of text on a computer. This application removes the drudgery normally associated with revision, aids in the collection of text, and can be a great motivational tool. One thing the word processor cannot do, however, is teach and evaluate a student's writing. Early writing CAI took advantage of the tutorial and evaluation capabilities of the computer, but lacked the ability to edit and revised text collected during a lesson. More recently, computer software has been developed that incorporates a word processor and addresses the four stages of the writing process.

Writing instructors realize that they must intervene in the writing process to promote invention on the part of the writer. Encouraging students to read their documents aloud during and after composing and providing feedback is one such intervention.

Oral composing takes advantage of the relationship that exists between oral and written language. Research indicates that poor writers rely more heavily on verbal language when writing, than do good writers. Writing instructors, using business communications as a model, have had writers compose and revise orally on a tape recorder. This method proved to be too time consuming, but the concept lives on in a new development in computer technology.

Voice synthesization, the generation of speech by a computer, has been combined with word processing to form a software package that allows a writer to collect, listen to, and revise text with relative ease. Early work with this type of system has produced results that indicate that this is a field worthy of further research and development.

CHAPTER III: RESEARCH METHODS

To measure the effectiveness of a voice synthesizer as a tool to enhance revision during the writing process, a study was conducted by this researcher. A sample was obtained that was representative of the target population. Members of this sample were randomnly assigned to either the experimental or control group and received equivalent instruction on how to use a word processor. A sample of each of the participants' writing was collected and graded by professional evaluators to act as base from which gain scores could be computed. The treatment was introduced and two additional samples of the participants' writing was collected and graded. The gain scores were compared using analysis of covariance to determine the level of treatment effect.

This chapter contains a description of both the population and sample used in this research project. A discussion of the treatment ensues, followed by a description of the measurement of the dependent and independent variables. A description of the research design is followed by a detailed review of the steps taken to collect and analyze the data. Finally, a discussion of the statistical tests and level of significance and a summary are provided.

Population

The population studied in this work is the commissioned officer corps of the U.S. Army. Today's Army attracts individuals from a variety of backgrounds to the Officer Corps. All personnel must be high school graduates, have attended at least two years of college, either male or female, and usually between the ages of 18 and 21. This study will be generalized to this population.

Sample

A good representation of this type of population can be found in the junior class (MS III) of the Cyclone Battalion of the Army Reserve Officer Training Corps. Whereas, they may become officers in either the Regular or Reserve Army in one year, it should be noted that these subjects are not yet commissioned officers. They must still undergo additional training and testing and some may never become officers. However, they all have an equal opportunity at successful completion of the program.

These 56 students are currently assigned writing projects in an attempt to enhance their writing skills prior to entry on active duty. All these cadets will experience the Army's new writing program while attending their respective Officer Basic Course.

The sample was taken from the Army ROTC MS III class of fifty-six students. The students were divided into quartiles according to their G.P.A.. An equal number students were randomly assigned to the experimental and control groups from each quartile, totalling twenty-eight students in all in each group. The stratified random sample ensured that the experimental and control group were equivalent in terms of academic achievement as determined by their G.P.A..

To facilitate statistical analysis, both the experimental and control groups were divided into two groups by G.P.A.. The upper G.P.A. groups contained those individuals who's G.P.A.'s were above the 50th percentile, while the lower G.P.A. groups contained those individuals who's G.P.A.'s were below the 50th percentile. For instructional and scoring purposes, the experimental and control groups were treated as intact entities.

Description of the Treatment

Subjects of both the experimental and control groups received equivalent instruction on the word processing package, "MacWrite". "MacWrite" is compatible with the Macintosh microcomputer that was used for this study. After the subjects demonstrated their ability to use the computer and software package, they were given their writing assignment. Each participant was required to write a 250-300 word biography

suitable for publication by the A.R.O.T.C. Advanced Camp Public Affairs Office. The drafts were collected and graded by professional evaluators. Then the treatment, "SmoothTalker", was introduced to the experimental group while the control group did additional work with "MacWrite".

"SmoothTalker" is a voice synthesizer/word processor software package that is compatible with the Apple Macintosh microcomputer. Using the built in word processor, a writer can write, listen to what was written, revise, and listen to the revisions. Documents collected using other Macintosh compatible word processors can also be read by "SmoothTalker".

"SmoothTalker" is a new concept in voice synthesizers. Early efforts in voice synthesizers stored digital numbers that were converted to signals and then sent to a speaker. The process of digitizing speech was costly and limited the voice synthesizer's vocabulary to only those words digitized. These early efforts in voice synthesization required additional hardware that was also costly.

"SmoothTalker" utilizes the digital analog converter (DAC) that is standard equipment on the mother board of the Macintosh to convert digitized information to analog mode that mimics human speech. The uniqueness of this voice synthesizer is that, except for the DAC, it is completely software driven, requiring no additional hardware. Any situation where a

Macintosh computer is available, has the ability of utilizing this voice synthesizer (Casey, 1984).

The subjects were required to revise their rough draft two additional times. To simulate the conditions that the cadets will face upon entry onto active duty, no feedback was given until the final draft was submitted. The experimental group used "SmoothTalker" for their revisions, while the control group continued using "MacWrite". As the word processing components of "SmoothTalker" and "MacWrite" are identical and the voice synthesizer requires only two keystrokes for use, the amount of new material introduced to the experimental group was minimal, therefore reducing any possible confounding effect.

Measurement of the Dependent Variable

Analysis of the writing skills is difficult due to the subjectiveness of writing scoring. A scoring rubric (See Appendix A), the Holistic Rating Scale used by the English Department of Iowa State University, was used to assess the writing ability of the subjects. Two readers from the Iowa State University English Department were retained to evaluate the three drafts of a 250 - 300 word biography required of the subjects. Each writing sample was scored by the evaluators on a scale from 1 to 6 in accordance with the scoring rubric. An average score for each sample was used for statistical analysis.

Inter-rater reliability was determined using Pearson Product Moment Correlation. See Table 1 for a listing, by draft, of the results of the correlation. As there were only two graders using a six point scale, a slight disparity in scoring on the part of the graders could be overemphasized during correlation computation. A correlation greater than .5, considered by Mason and Bramble (1978) to indicate a moderate to high relationship, was acceptable and the ratings were assumed to be reliable.

Table 1. Inter-Rater Reliability

N	Draft 1	Draft 2	Draft 3
56	.5928	.6182	.5476

Measurement of the Independent Variables

Academic achievement was measured by G.P.A. score obtained from the class's grade roster. A variety of test scores were considered as measurement of academic achievement, G.P.A. was finally accepted as it was the only score common to all participants in the research study.

A sign-in log was maintained by the Computer Laboratory personnel that reflected the amount of time each subject used the computer. All subjects were required to identify

themselves and sign in and out of the Macintosh microcomputer laboratory. These times were summed at the conclusion of each week and recorded by the researcher. Any subject's time that totalled less than 15 minutes for the week was recorded as 0.00 hours. This was done because it takes at least 5 to 10 minutes to sign into the laboratory, checkout the proper software and hardware, and boot the software in the computer. Not much could be accomplished in the remaining amount of time.

Design

The design will conform to the standards set forth by Campbell and Stanley (1963):

R	O	X	O	O
R	O		O	O

The observation before the introduction of the treatment was the composition of the first draft. The subjects of both the control and experimental groups were required to revise the draft twice after the introduction of the treatment.

Research Procedures

As this study dealt with human subjects, prior approval was obtained from the Iowa State Human Subjects Committee (see Appendix B) to ensure that the subjects would not be adversely affected by participation in this study. Consent to

participate in this research was obtained from the class members during the first week of the Spring semester, 1986. Appendix C is a copy of the letter of consent submitted to and signed by each research participant. The benefits of learning a word processing system was stressed to the cadets at that time. The cadets were also informed that they were required to use the Macintosh word processing program, "MacWrite" (Wiggington, 1983), for their writing assignments.

Prior to their MS III year, cadets sign formal contracts with the U.S. Army obligating them to remain in R.O.T.C. for the remainder of their college career. Since cadets cannot drop out of class once they have reached this level, mortality of the sample remained low. Fifty-five of the fifty-six class members granted permission for their data to be used in this project. Of the fifty-five, three were discharged from the A.R.O.T.C. program before the actual research was conducted and one was absent due to illness throughout the three week research period.

Each student participating in this research was issued an initialized Macintosh disk for storing text composed using "MacWrite". It was important that all students became familiar with loading text files from a separate data disk into another program, as the experimental group would be loading text files into the "SmoothTalker" program during the introduction of the treatment. By ensuring that all students were familiar with

this process prior to the introduction of the treatment, equity was ensured between the control and experimental groups.

Figure 3 is offered as an overview of the flow of the research study. The word processing package was taught to all participants during the beginning of the Spring semester prior to Secondary Education 301's use of the Macintosh Laboratory. The Macintosh Laboratory was reserved for eight one hour consecutive blocks. Members of the MS III class signed up for one of those eight blocks of instruction. No more than ten students were rotated through the Macintosh Laboratory each hour to undergo training on the "MacWrite" word processing system. This one hour of training satisfied one of their three hour weekly requirement of Military Science instruction.

As illustrated in Appendix D, Macintosh training consisted of a brief introduction to the computer by the researcher. During the remainder of the hour the students worked through the audio cassette/disk "Tour of MacWrite"" provided by Apple Computer, Inc. This program ensured that all the cadets received equitable training on the computer. Before leaving the Macintosh Laboratory, each cadet worked through and printed a short practice document to verify his/her ability to work with the system (see Appendix E).

The cadets were assigned to compose a 250 - 300 word biography suitable for submission to the ROTC Advanced Camp Public Affairs Office. The due date for the assignment was one

week from the day of training. Cadets from both the experimental and control groups did their rough drafts of their writing assignment on the Macintosh. This distributed the benefit of the word processor to all students and eliminated the possible confounding effect that would occur if only the experimental group worked on the computer.

Careful monitoring of the lab usage log indicated that less than fifty percent of the subjects had used the Macintosh laboratory to complete their first draft by two days prior to the completion date. Investigation into the cause of the delay uncovered an internal mix-up in the cadet chain of command which generated information countermanding this researcher's assignment due date. This situation was rectified and all participants in this study completed their assignment on time.

In order that the amount of time each cadet spent on the computer would be devoted to the writing process the requirement of handing in two printed copies of their was dropped. Instead, each cadet was to save his/her draft on the provided data disk by the due date. To alleviate any mix-up that might occur, each student was also required to include his/her identification number and the draft number at the top of each biography, as well as using them for the file name. The researcher then assumed the responsibility of printing out the copies to be submitted to the readers each week. This reduced the amount of extraneous time the cadets spent on the

computer, enabling the increased number to successfully collect their first draft during the two days prior to the completion date.

The students did not receive any feedback on their drafts, but received credit for handing them in. Not receiving feedback on the drafts should have had no detrimental effect on the cadets, as once the cadets enter upon active duty there will be little opportunity for them to receive feedback on their writing drafts prior to final submission. They must heavily rely upon their own revision skills. As research indicates, writers benefit from an increased number of revisions (Lansing, Ingebo, & Leonard, 1984). Therefore, this procedure should have benefited the cadets by simulating the situation that they will encounter later in their careers.

One week later, the students in the experimental group received one hour of training on the use of "Smoothtalker". The experimental group received instructions on how to make "Smoothtalker" read their document to them and how to edit documents in "Smoothtalker" (see Appendix F). The cadets used their previously acquired knowledge to load a text file from their data disk and save it again to the data disk. Due to the similarities between the editing features of "SmoothTalker" and "MacWrite", the instructional time expended was minimal.

For the remainder of the hour, the experimental group worked through a series of exercises designed to further

increase their familiarity with the computer and reduce any anxiety. The control group spent the entire hour working through the same exercises using "MacWrite" only. This helped to ensure that the experimental group was afforded a generally equal amount of time to revise using "SmoothTalker" as the control group had to revise using only "MacWrite" during their one additional hour of instruction.

The students were given one week to individually use the Macintosh laboratories to revise their biography. The experimental group used "Smoothtalker" and the control group only used "MacWrite". A computer lab usage log sheet was maintained by the Computer Laboratory personnel to ensure that the cadets fulfilled this requirement.

At the conclusion of the week, the cadets saved the second draft of their biography and the researcher printed out two copies of each for submission to the graders. Major Tordillos once again credited the cadets with fulfilling the two draft requirement, but offered them no feedback concerning their writing product.

The cadets were then required to revise once more, the experimental group using "SmoothTalker" and the control group using "MacWrite". A computer lab usage log sheet was maintained by Computer Laboratory personnel to ensure that the cadets fulfilled this requirement. At the conclusion of the

week, the cadets saved their final drafts and the researcher printed out two copies of each for submission to the graders.

Requiring the cadets to revise twice before handing in their final draft, ensured that the experimental group used "SmoothTalker" at least twice before turning in their final drafts. This should have allowed enough time for the experimental group to become comfortable with the program. It also afforded the opportunity for the experimental group to utilize the treatment for an amount of time that was equivalent to the control group's usage of "MacWrite". Simply requiring that the cadets use the programs for a specified time ensured the quantity of time of exposure, but not the quality of time of exposure. How long the cadets used either "SmoothTalker" or "MacWrite" was their own decision. Increasing the number of drafts would not have focused on the amount of time spent on the computer, but rather on how well that time was spent on the computer.

The students' three drafts were codified to protect the identity of the cadets and then forwarded to the two readers retained for evaluation. The evaluators scored the writing samples on a score from 1 to 6, in accordance with the scoring rubric used by the English Department of Iowa State University. The evaluators' scores were averaged to use in statistical analysis.

Tests of Significance

Campbell and Stanley (1963) recommend using the more precise test of significance in pretest - posttest gain scores, analysis of covariance. The first draft scores were used as the covariate. The participants in this study come from a variety of academic disciplines. Some academic disciplines require students to write more than others and the more practice one has at writing, the better the writing product tends to be. By using the first draft score as a covariate, the writing skills that each participant brought to this study were statistically controlled and comparisons could be made on the effect of the treatment alone. Because of an administrative error during the collection of the first draft, more than fifty percent of the subjects did not work on the computer until two days prior to the assignment due date.

Comparisons were made between the control and experimental groups' differences in treatment effect on subjects with varying academic achievement as determined by G.P.A. score using Pearson product-moment correlation coefficient. Statistically significant correlations were further examined using a two by two analysis of variance to determine the degree of interaction effect between the subjects' academic achievement and treatment group on the quality of their writing products.

Additional comparisons were made between the control and experimental groups' time on the computer and subsequent draft score using Pearson product-moment correlation coefficient.

Level of Significance

A review of the literature reveals that there has not been a great deal of research in this area. The level of significance was therefore set at .10, as this was exploratory research.

Summary

Fifty-one members of the Army Reserve Officer Training Corps' junior (MS III) class received training in the use of the simple word processor, "MacWrite". "MacWrite" is a word processor available for the Macintosh. Training consisted of a brief introduction by the researcher, followed by each cadet working through the cassette/floppy disk tutorial provided by the makers of "MacWrite". The cadets printed out a practice paragraph to verify their ability to work with the word processing system.

Prior to their introduction to word processing, the MS III class members were stratified according to G.P.A. score and were randomly assigned to either the experimental or control group. Major Tordillos, the primary MS III instructor, required that each student prepare a 250 - 300 word biography.

Due to time constraints, each cadet saved his/her draft on a provided data disk. The researcher subsequently printed out two copies of each draft for submission to the graders.

The experimental group was given a one hour introduction to "Smoothtalker", a voice synthesizer program available for the Macintosh. This group was required to use "Smoothtalker" and its built in word processor for further revision. The control group did additional work with "MacWrite" instead of "Smoothtalker" during their additional one hour of supervised instruction. The control group's revision was done using "MacWrite" only.

The second draft of each student's biography was printed out by the researcher for submission to the evaluators. The cadets were then required to revise once more, the experimental group using "SmoothTalker" and the control group using "MacWrite". A computer lab usage log sheet was maintained by Computer Laboratory personnel to ensure that the cadets fulfilled this requirement. Two copies of the final draft were printed out by the researcher for to be submitted to the evaluators.

The drafts were codified to protect the identity of the cadets and forwarded to the two retained judges for evaluation. The two judges rated the writing samples on a scale of 1 to 6, in accordance with the scoring rubric used by the English Department of Iowa State University.

The scores of the two judges were averaged for statistical analysis, inter-rater reliability was: .5928 for the first draft, .6182 for the second draft, and .5476 for the third draft. This was considered, by the researcher, to be at an acceptable level. Inter-group comparisons were made of the changes in the writing product between the control and experimental group. Analysis of covariance was computed using the first draft scores as the covariate. A two by two analysis of variance was calculated to determine the degree of interaction effect between academic achievement and treatment group on the quality of the writing product. Pearson product-moment correlation coefficient was computed to determine the level of interaction between the subjects' time on the computer and subsequent draft scores. The level of significance was set at .10, as this research was determined to be exploratory in nature.

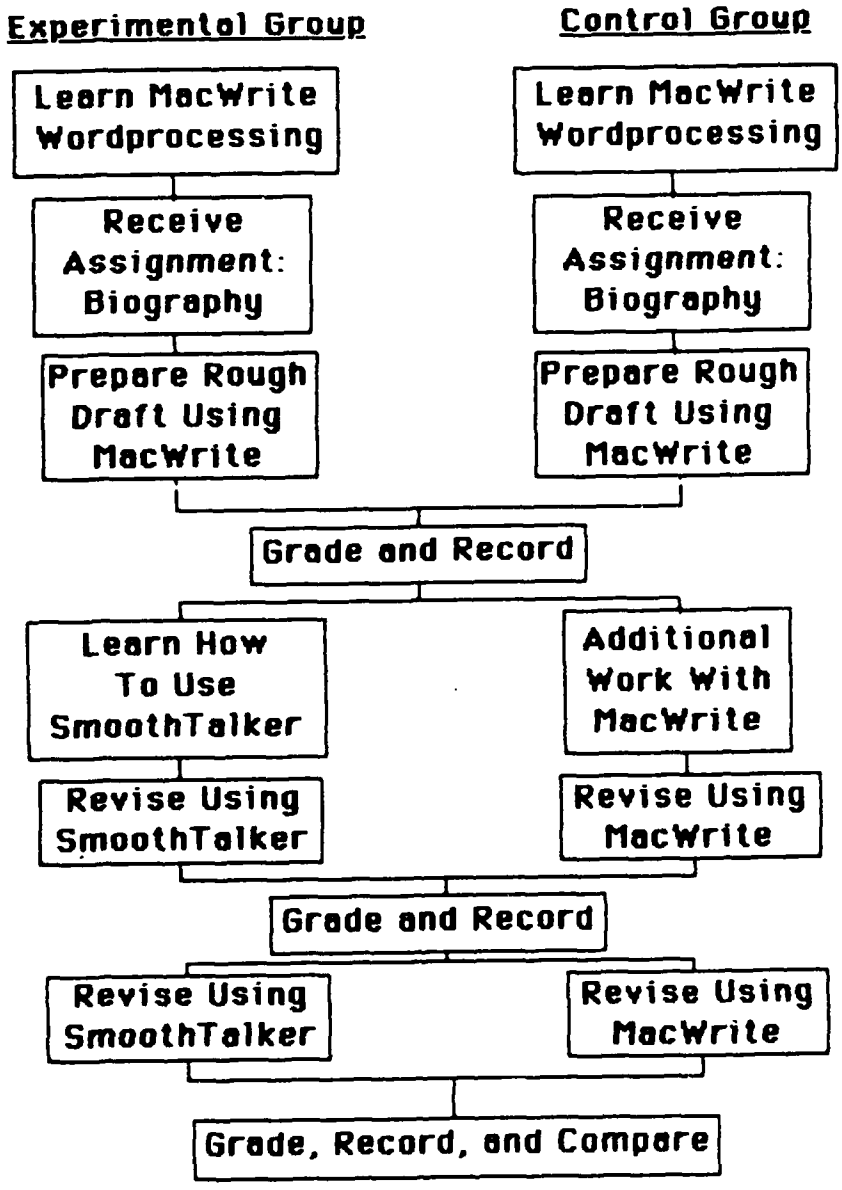

Figure 3. Research Study Flowchart

CHAPTER IV: RESULTS

The results of this study will be presented and discussed as they relate to the hypotheses of the study delineated in Chapter 1. As an overview, the calculated general group statistics are presented first, followed by the tests of the hypotheses.

General Group Statistics

As the results of the study are presented, it is important to remember that the holistic scoring rubric used rates writing on a scale of 1 to 6. A score of 1 indicates the best writing, while a score of 6 indicates a severely flawed document.

As seen in Table 2, the mean for all three draft scores for the experimental group remained constant at 4.320. The average experimental group scores for all three drafts ranged from a low of 5.50 to a high of 2.50. The standard deviation of the scores fluctuated from 0.675 on the first draft to 0.627 on the second and finally rising to 0.690 on the third draft. This indicates that the distribution of the scores did change slightly although the means remained the same for all three draft scores.

During the first week, the experimental group spent an average of 1.530 hours on the computer. The greatest

amount of time for any one individual was 6 hours, the shortest was less than 15 minutes which was recorded as 0 hours. The students recording 0 hours on the computer typically wrote and revised their documents using the paper and pen method and simply entered the completed document onto the computer.

Table 2. Experimental Group Statistics

	Mean	Max	Min	Std Dev
Draft I	4.320	5.50	3.00	0.675
Draft II	4.320	5.50	3.00	0.627
Draft III	4.320	5.50	2.50	0.690
Hrs I	1.530	6.00	0.00	1.200
Hrs II	1.560	5.00	0.00	1.088
Hrs III	1.040	2.50	0.00	0.825

Members of experimental group spent a little more time on the computer during the second week of the study after the introduction of the treatment, averaging 1.560 hours. The maximum amount of time spent by any one student was 5 hrs, while the least amount of time was less than 15 minutes.

The average time spent on the computer by the experimental group dropped to 1.040 during the last week of the study. The maximum amount of time any one group

member spent on the computer also dropped to 2.5 hrs, while the least amount of time remained at less than 15 minutes.

As seen in Table 3, the means for the three draft scores of the control group, unlike those of the experimental group, fluctuated. The mean score of the first draft was 4.058, while the mean of the control group's second draft was 4.346. The mean of the third and final draft was 4.038. The control group's scores ranged from a high of 3.00 to a low of 5.50. The spread of the scores, as exhibited by the standard deviation, drew smaller as the members of the control group revised. The standard deviation of the first draft scores, 0.571, dropped to 0.505 on the second draft scores, and dropped further to 0.467 on the third draft scores.

Members of the control group spent an average of 1.567 hours on the computer during the first week of the study. The greatest amount of time that any one control group member spent on the computer during the first week was 6 hours, while the least amount of time was less than 15 minutes.

The control group, like the experimental group, spent less time on the computer during the second week of the study averaging 0.856 hours. The maximum amount of time that any one individual spent on the computer during

the second week was 1.75 hours, a sharp contrast to the first week. The least amount of time spent on the computer was less than 15 minutes.

Table 3. Control Group Statistics

	Mean	Max	Min	Std Dev
Draft I	4.058	5.00	3.00	0.571
Draft II	4.346	5.00	3.50	0.505
Draft III	4.038	5.00	3.50	0.467
Hrs I	1.567	6.00	0.00	1.126
Hrs II	0.856	1.75	0.00	0.597
Hrs III	1.115	3.50	0.00	0.901

Time on the computer for the control group rose during the third and final week of the study to an average of 1.115 hours. The greatest amount of time a member of the control spent on the computer was 3.5 hours, while the least amount was less than 15 minutes.

The remainder of this chapter is a presentation and a discussion of the statistical tests of significance and their relation to the three hypotheses presented in Chapter 1.

Hypothesis 1

Hypothesis 1 was stated as follows: There will be no significant difference in the writing product between the experimental and control group after using Smoothtalker during the revision step of the writing process.

On the average, the control group had a higher quality draft score by 0.262 points on the first draft, but performed an average 0.026 points lower than the experimental group on the second draft. The control group once again outperformed the experimental group on the third and final draft by an average of 0.282 points.

An analysis of covariance was calculated on the second and third draft scores to determine if these differences were significant. The first draft was used as the covariate. Table 4 presents the results of the analysis of covariance for the second draft.

The differences in the average performances of the experimental and control groups were attributable to differences in the individual writing abilities of the participants in this study. When individual writing ability was statistically controlled by using the first draft score as the covariate, the significance of the F ratio of the main effect of the treatment was calculated

to be 0.190. The significance of the F ratio was greater than the alpha level of .10.

Table 4. Analysis of Covariance - Draft II

	Sum of Squares	DF	Mean Square	F	Signif of F
Covariate: Draft I	5.606	1	5.606	27.279	0.000
Main Effects	0.363	1	0.363	1.768	0.190
Explained	5.969	2	2.985	14.523	0.000
Residual	9.864	48	0.206		
Total	15.833	50	0.317		

Table 5 presents the findings of the analysis of covariance of the third draft scores.

Table 5. Analysis of Covariance - Draft III

	Sum of Squares	DF	Mean Square	F	Signif of F
Covariate: Draft I	5.595	1	5.595	22.299	0.000
Main Effects	0.272	1	0.272	1.082	0.303
Explained	5.867	2	2.934	11.690	0.000
Residual	12.045	48	0.251		
Total	17.912	50	0.358		

The differences in the average performances of the experimental and control groups in the third draft scores were also attributable to differences in the individual writing abilities of the participants in this study. Once again, when individual writing ability was statistically controlled by using the first draft score as the covariate, the significance of the F ratio of the main effect of the treatment, 0.303 was calculated to be greater than the alpha level of .10.

As the second and third draft scores of the experimental and control group were not significantly different, the null hypothesis 1 cannot be rejected.

Hypothesis 2

Hypothesis 2 was stated as follows: There will be no significant interaction effect between the subjects' academic achievement, as measured by G.P.A., and treatment group on the quality of their writing products, as measured by the independent scorers.

As the random sample was stratified according to academic achievement as measured by G.P.A., the experimental and control groups were equivalent in terms of the academic achievement level of their respective populations. Analysis, using two by two analysis of variance, determined the degree of interaction effect

between the subjects' academic achievement and treatment group on the quality of their writing product. Table 6 presents the results of that analysis for draft I.

The significance of the F ratio computed for the main effects of the treatment group was 0.136. The significance of the F ratio was greater than the alpha level of .10. The F ratio for the interaction effect of treatment group and academic achievement, as measured by G.P.A., was 1.110. The significance of the interaction F ratio was calculated to be 0.297. The significance of the F ratio was greater than the alpha level of .10.

Table 6. Analysis of Variance by DraftI, Treatment Group, and Academic Achievement (G.P.A.)

Source of Variation	Sum of Squares	DF	Mean Square	F	Signif Of F
Main Effects	0.957	2	0.479	1.210	0.307
Group	0.908	1	0.908	2.296	0.136
G.P.A.	0.080	1	0.080	0.203	0.655
Two-Way Interactions	0.439	1	0.439	1.110	0.297
Group G.P.A.	0.439	1	0.439	1.110	0.297
Explained	1.396	3	0.465	1.177	0.329
Residual	18.584	47	0.395		
Total	19.980	50	0.400		

Table 7 is a presentation of the results of the analysis of variance of draft II. The significance of

the F ratio computed for the main effects of the treatment group was 0.917. The significance of the F ratio was greater than the alpha level of .10. The F ratio for the interaction effect of treatment group and academic achievement, as measured by G.P.A., was 1.638. The significance of the interaction F ratio was calculated to be 0.207. The significance of the F ratio was greater than the alpha level of .10.

Table 7. Analysis of Variance by DraftII, Treatment Group, and Academic Achievement (G.P.A.)

Source of Variation	Sum of Squares	DF	Mean Square	F	Signif Of F
Main Effects	0.280	2	0.140	0.438	0.648
Group	0.004	1	0.004	0.011	0.917
G.P.A.	0.271	1	0.271	0.848	0.362
Two-Way Interactions	0.524	1	0.524	1.638	0.207
Group G.P.A.	0.524	1	0.524	1.638	0.207
Explained	0.804	3	0.268	0.838	0.480
Residual	15.029	47	0.320		
Total	15.833	50	0.317		

Presented in Table 8 are the results of the two by two analysis of variance for draft III. The significance of the F ratio computed for the main effects of the treatment group was 0.080. The significance of the F ratio was less than the alpha level of .10. The F ratio

for the interaction effect of treatment group and academic achievement, as measured by G.P.A., was 4.252. The significance of the interaction F ratio was calculated to be 0.045. The significance of the F ratio was less than the alpha level of .10.

Table 8. Analysis of Variance by DraftIII, Treatment Group, and Academic Achievement (G.P.A.)

Source of Variation	Sum of Squares	DF	Mean Square	F	Signif Of F
Main Effects	1.129	2	0.564	1.723	0.190
Group	1.051	1	1.051	3.210	0.080
G.P.A.	0.118	1	0.118	0.361	0.551
Two-Way Interactions	1.393	1	1.393	4.252	0.045
Group G.P.A.	1.393	1	1.393	4.252	0.045
Explained	2.521	3	0.840	2.566	0.066
Residual	15.391	47	0.327		
Total	17.912	50	0.358		

Table 9 is a presentation of the treatment group means for all three drafts. Upper G.P.A. group members who were also members of the experimental group showed a slight improvement in draft quality with mean scores of 4.22, 4.19, and 4.16 for the first, second, and third draft respectively. Upper G.P.A. members of the control group exhibited a decrease in the quality of their writing with mean scores of 4.10, 4.37, and 4.13. The

mean scores for members of the control and experimental groups whose G.P.A.'s are below the 50th percentile reflected a much greater difference. Experimental group members whose G.P.A. was below the 50th percentile recorded mean scores that decreased over the duration of the study. These subjects averaged 4.22 on the first draft, 4.56 on the second, and averaged 4.61 on the third draft score. Lower G.P.A. members of the control group averaged 4.00 on the first draft, 4.32 on the second, and 3.91 on the third and final draft.

Table 9. Mean Scores by G.P.A. Grouping

G.P.A. Group	Experimental Group	Control Group
Draft I		
Upper	4.22	4.10
Lower	4.50	4.00
Draft II		
Upper	4.19	4.37
Lower	4.56	4.32
Draft III		
Upper	4.16	4.13
Lower	4.61	3.91

As there was a significant interaction effect between the subjects' academic achievement and treatment group on the quality of the third draft, the null hypothesis 2 is rejected and the alternate hypothesis accepted. There is a significant interaction effect

between the subjects' academic achievement, as measured by G.P.A., and treatment group on the quality of their writing products, as measured by the independent scorers.

Hypothesis 3

Hypothesis 3 was stated as follows: There will be no significant correlation between the amount of time the subjects' spend working on the computer and the quality of their writing products, as measured by the independent scorers.

Table 10. Pearson Product Moment Correlation Coefficient Hrs on Computer and Draft Score

Overall	Draft I	Draft II	Draft III
Exp Group Hrs on the Computer	0.0712 p = .368	0.1310 p = .266	0.2612 p = .104
Ctrl Group Hrs on the Computer	0.0792 p = .350	0.0561 p = .393	0.0347 p = .433

The control group spent 0.037 hours more on the computer than the experimental group on the first draft and 0.075 hours more on the computer during the revision of the third draft. The experimental group, however, spent on the average 0.704 hours more on the computer

during revision of the second draft than did the control group.

Pearson product moment correlation coefficients were calculated to determine the strength of the relationship between the amount of time the subjects spent upon the computer and their draft scores. Table 10 reflects the results of those calculations.

The correlations between the hours on the computer and the draft scores for the experimental group were, 0.0712 for the first draft, 0.1310 for the second, and 0.2612 for the third draft. The correlations between the hours on the computer and the draft scores for the control group were, 0.0792 for the first draft, 0.0561 for the second, and 0.0347 for the third. None of these correlations proved to be significant as all p's calculated were greater than .10.

As the correlations between time spent on the computer and draft scores were not significant, the null hypothesis 3 cannot be rejected.

Summary

The members of the experimental group averaged 4.320 on all three draft scores. Although the experimental group's mean score remained consistent, there was some

fluctuation in individual grades as indicated by a change in the standard deviations, the spread of the scores. The control group wrote higher quality first and third drafts, averaging 4.058 and 4.038 respectively, but wrote lower quality second drafts, averaging 4.346. The range of scores of the control and experimental group were similar, 3.00 to 5.50, except for one individual in the experimental group who received a score of 2.50 on her third and final draft.

The control group spent 0.037 hours more on the computer working on the first draft and 0.075 hours more on the third draft than the experimental group. Members of the experimental group spent an average 0.704 hours more on the computer working on the second draft than the control group. Statistical tests of significance were calculated to determine the degree of relationship these findings had with the hypotheses stated in Chapter 1.

Gain scores were examined using analysis of covariance, statistically controlling for differences in individual writing ability by using the first draft as the covariate. When individual differences in writing ability were statistically controlled there was no significant difference in the second and third draft scores of the experimental and control groups. Because of this the null hypothesis 1 was not rejected.

A two by two analysis of variance was calculated to determine the degree of interaction between the subject's academic achievement and treatment group on all three drafts. The significance of the F ratio of the first draft was 0.297 and 0.207 for the second draft. Both of these were below the alpha level of .10. The significance of the F ratio of draft III was computed to be 0.045, which was less than the alpha level of .10. An examination of the group mean scores of the third draft revealed that control group members whose G.P.A. were below the 50th percentile averaged 3.91, while members of the experimental group averaged 4.61. There was little difference in mean scores between members of the experimental and control groups whose G.P.A. were above the 50th percentile.

As the interaction effect between academic achievement and treatment group on the third draft proved to be significant, the null hypothesis 2 was rejected and the alternate hypothesis accepted.

Pearson product moment correlation coefficients were also calculated to determine the strength of the relationship between the amount of time the subjects spent on the computer and their subsequent draft scores. The correlation coefficients for the experimental group were 0.0712 for the first draft, 0.1310 for the second,

and 0.2612 for the third draft score. The correlation coefficients for the control group were 0.0792 for the first draft, 0.0561 for the second, and 0.0347 for the third and final draft score. None of these correlations were significant.

As there was no significant correlation between the amount of time the subjects' spent upon the computer and their subsequent draft score, the null hypothesis 3 cannot be rejected.

CHAPTER V: SUMMARY, IMPLICATIONS, AND CONCLUSIONS

The recent decline in basic writing skills of entering personnel has prompted the Army to implement a new writing program in all Army service schools. Although the present program makes little use of the computer, this would appear to be an area where the computer might be most useful. There are currently many computer programs available to assist the writer in the four steps of the writing process. One of the most promising uses of the computer in teaching writing, however, is the use of a word processor during the composing stage (Shostak, 1984).

Word processors have also been incorporated into writing instruction software to combine the benefits of a word processor with evaluation and tutorial capabilities of the computer. Recently, a voice synthesizer has been combined with a word processor to produce a relatively inexpensive software package that is accessible to Macintosh microcomputer owners. Future development in this area should produce similar voice synthesizer/word processor software that will be compatible with a wider variety of computers.

The researchers and developers of this software claim that a voice synthesizer/word processor will be extremely helpful in the editing and revision stages of

the writing process. The remainder of this chapter contains a summary of a research study that examined the accuracy of this claim, a discussion of the findings of this research project, and a discussion of the implications of the findings of this study.

Summary

The proponents of the computer software program "SmoothTalker" claim that utilizing the combination of a word processor and voice synthesizer during the revision stage of the writing process will improve the quality of the written work. This study was an attempt to provide empirical evidence that would either support or refute this claim.

This study also examined the effects of a voice synthesizer on subjects of varying academic achievement, as measured by G.P.A. Both the amount of time the control and experimental group actually spent working on the computer and any effect that this had on the writing product was examined as well.

Fifty-one members of the Army Reserve Officer Training Corps' junior (MS III) class received training in the use of the word processor, "MacWrite". "MacWrite" is a word processor available for the Macintosh. Training consisted of a brief introduction by the

researcher, followed by each cadet working through the cassette/floppy disk tutorial provided by the makers of "MacWrite". The cadets printed out a practice paragraph to verify their ability to work with the word processing system.

Prior to their introduction to word processing, the MS III class members were stratified by quartile according to G.P.A. score and were randomly assigned from each quartile to either the experimental or control group. The members within each group were further subdivided by G.P.A. scores. Members with G.P.A. scores above the 50th percentile were considered the upper G.P.A., while members with G.P.A.'s below the 50th percentile were relegated to the lower G.P.A. group. These divisions by G.P.A. were used for statistical analyses purposes only. Major Tordillos, the primary MS III instructor, required that each student prepare a 250 - 300 word biography. Due to time constraints, each cadet saved his/her draft on a provided data disk. The researcher subsequently printed out two copies of each draft for submission to the graders.

The experimental group was given a one hour introduction to "Smoothtalker", a voice synthesizer program available for the Macintosh. This group was required to use "Smoothtalker" and its built in word

processor for further revision. The control group did additional work with "MacWrite" instead of "Smoothtalker" during their additional one hour of supervised instruction. The control group's revision was done using "MacWrite" only.

The second draft of each student's biography was printed out by the researcher for submission to the evaluators. The cadets were then required to revise once more, the experimental group using "SmoothTalker" and the control group using "MacWrite". A computer lab usage log sheet was maintained by Computer Laboratory personnel to ensure that the cadets fulfilled this requirement. Two copies of the final draft were printed out by the researcher and submitted to the evaluators.

The drafts were encoded to protect the identity of the cadets and forwarded to the two retained judges for evaluation. The two judges rated the writing samples on a scale of 1 to 6 (1 denoting highest quality, 6 the lowest quality), in accordance with the scoring rubric used by the English Department of Iowa State University.

The scores of the two judges were averaged for statistical analysis, inter-rater reliability was determined to be; .5928 for the first draft, .6182 for the second draft, and .5476 for the third draft. This was considered, by the researcher, an acceptable level

(Mason & Bramble, 1978). Inter-group comparisons were made of the changes in the writing product between the control and experimental group. Analysis of covariance was computed using the first draft scores as the covariate. Two way analysis of variance was computed to determine the level of interaction between academic achievement, as measured by G.P.A. score, and treatment group on the quality of the writing product. Pearson product moment correlation coefficients were computed to determine the degree of relationship between time spent on the computer and subsequent draft scores. Throughout, the level of significance was set at .10, as this research was exploratory in nature.

A review of the group means, provided in Table 11, exhibits an interesting relationship. The control group's writing product's quality on the average fluctuated, while the experimental group remained constant at 4.320.

Implications and Recommendations

A look at the amount of time spent on the computer showed no significant correlation between the number of hours spent on the computer and draft scores. Although the correlations were not significant, there is a relationship between the time on the computer and the

mean draft scores of the control group. The amount of time that the control group spent on the computer during the revision of the second draft was almost one-half the amount of time spent on draft I. The quality of the second draft was less than the first draft for the control group. The control group's time on the computer increased during the revision of the third draft and apparently the quality of the draft also increased.

Table 11. Review of Group Means

	Experimental Mean	Control Mean	Mean Difference
Draft I	4.320	4.058	0.262
Draft II	4.320	4.346	0.026
Draft III	4.320	4.038	0.282
Hrs I	1.530	1.567	0.037
Hrs II	1.560	0.856	0.704
Hrs III	1.040	1.115	0.075

A closer look at this relationship gives a possible insight into the differing work habits of the control group. It appears as if many of the members of the control group did not take the second draft seriously as they were not receiving a grade for it. This idea is reinforced by the fact that the amount of time the control group spent on revising the third and letter graded draft increased sharply. Both the experimental and control groups were learning how to use a word processor and were collecting their original text for draft I during the first week. As this was a new experience for almost all of the subjects, their time on the computer was similar. There was no great drop in the time on the computer for the experimental group during the revision of draft II. Familiarization with the treatment appears to have maintained the level of interest in draft II in the experimental group. During the third and final week, the control group spent more time on the computer and improved the quality of their draft, not only over the second draft, but over the first draft as well. The experimental group, on the other hand, spent a little less time on the computer and maintained a mean score of 4.320.

Although there were no statistically significant differences in the quality of the writing products

between the experimental and control groups as a whole, the treatment did have a different effect on subjects in the lower and upper G.P.A. groupings. Table 12 is a presentation of treatment group mean scores by G.P.A. grouping. Prior to the introduction of the treatment, lower G.P.A. members of the experimental group scored 0.50 quality points lower on the first draft than their control group counterparts. After the introduction of the treatment, the lower G.P.A. grouped experimental subjects' draft quality dropped slightly, while the upper G.P.A. experimental group members' draft quality rose slightly. Another week of working with the treatment continued to decrease the quality of the writing of the lower G.P.A. experimental group members, while slightly increasing the upper G.P.A. experimental group's writing quality.

Contrasting the relationships in the draft score means by treatment group and G.P.A. group finds that while the upper G.P.A. experimental group members were apparently kept on task and showed slight improvement while using the treatment, the members of the lower G.P.A. experimental group were adversely affected by the treatment. Members of the lower G.P.A. control group scored 0.70 points higher in quality on the third draft score than did the experimental group. Contrast this

significant difference to the insignificant difference between the control and experimental groups in the upper G.P.A. group of 0.03 points on the third draft and a possible problem with the wholesale integration of voice synthesizer/word processors into the writing curriculum becomes apparent.

Table 12. Mean Scores by G.P.A. Grouping

G.P.A. Group	Experimental Group	Control Group
Draft I		
Upper	4.22	4.10
Lower	4.50	4.00
Draft II		
Upper	4.19	4.37
Lower	4.56	4.32
Draft III		
Upper	4.16	4.13
Lower	4.61	3.91

It appears as if the treatment had an adverse effect upon the lower G.P.A. experimental group members. Applying this statistical information to the communication model discussed in Chapter 2, one could say that the treatment acted as noise, interferring with the transmission and reception of the intended message (Simonson & Volker, 1984). At the same time, the treatment appeared to have a stabilizing effect upon

members of the upper G.P.A. experimental group. In both cases, further examination is warranted.

Before implementation into the classroom, further studies must be conducted that examine in more detail the effects of voice synthesizers/word processing software on individuals of varying academic achievement. Future studies should include a precise accounting of what types of revision and editing are conducted by writers using voice synthesizers while writing. The precise accounting of types of revision can be compared to the amount of time spent on the computer to determine if the addition of a voice synthesizer increases the quality and/or quantity of time on the computer. The long term effects of a voice synthesizer must also be examined. It is quite possible that the stabilizing effect of the voice synthesizer that was evident in the upper G.P.A. experimental group members was due to the novelty effect of the new technology. A study conducted over a full semester would provide a greater insight into the effectiveness of the voice synthesizer as a tool to enhance writing skills.

Finally, it is important to note that this study was conducted without any intervention on the part of the researcher or A.R.O.T.C. instructors in providing feedback to the subjects. The absence of a marked

improvement in the writing scores of all the participants supports the concern expressed in Chapter I that revision without a critique by someone other than the author will not necessarily lead to a higher quality writing product. An ancillary indication of this study is that the interaction effects of teacher intervention upon the quality of the writing product must be closely examined. It would also be most beneficial if there were future studies that examined the interaction effects of a voice synthesizer and teacher intervention upon the quality of the writing product.

Conclusion

Communication skills are becoming increasingly more important as the amount of information available in this age of technology rapidly increases. Using the same technology that is responsible for this information explosion to assist in improving the communication skills required to deal with the increased amount of information seems to be a most logical approach.

Great care must be exercised, however, when integrating technology into the curriculum. Whereas traditional instruction focused on a group of students and attempted to make that instruction as suitable as possible to the group as a whole; the advent of new

technology, most notably the computer, allows for a more individualized approach. The effects of the computer must be examined for the wide variety of individuals that will be exposed to it.

Nowhere is this more true than in writing instruction. Writing is a very personal experience in one sense. Yet, because it is an act of communication, it is in its very nature a sharing experience. The writer shares his/her personal thoughts with one or more other individuals. Voice synthesizer/word processing software packages may be able to bridge the gap between the more personal experience of writing to the more global sharing experience. Before wholesale implementation of these software packages, further studies are necessary to ensure that they are used in the most beneficial manner possible. These studies must examine not only how the voice synthesizer/word processing software packages affect the writing process, but how they can be made to affect the writing process by the writing instructor.

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ACKNOWLEDGEMENTS

"The Moving Finger writes; and, having, writ,
Moves on: nor all your Piety nor Wit
Shall lure it back to cancel half a Line,
Nor all your Tears wash out a Word of it."

- The Rubaiyat of Omar Khayyam -

Before I move on, however, I would like to take this opportunity to thank all those whose assistance made this study a success. I would like to extend my deepest appreciation to Dr. Ann Thompson, my major professor. Her guidance and support has been unswerving throughout the course of my graduate studies. At this time I would also like to thank the other members of my graduate committee, Dr. Mike Simonson and Dr. Cliff Smith, who provided me with timely feedback and advisement during my graduate endeavors.

I am especially grateful to my fellow graduate students and student assistants whose help proved invaluable while the research study was being conducted. A special note of thanks must also be extended to Lieutenant Colonel J. Vincent, Professor of Military Science, and Major F. Tordillos, Assistant Professor of Military Science. Without the permission and support of these individuals, this study could not have been conducted.

In closing, I would like to thank Linda McFarlane for her support and encouragement through the tough times and my mother, Margaret Howlett, for all the cups of coffee.

APPENDIX A: HOLISTIC RATING SCALE

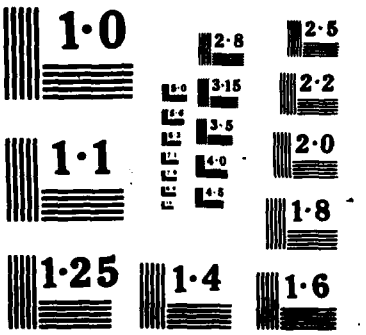
HOLISTIC RATING SCALE RUBRIC

The following is a copy of the scoring rubric used by the English Department of Iowa State University.

Score	Description of Writing
1	Thesis well-developed with detail. Organized and Coherent. Effective word choice and usage: some complex constructions. Few errors in mechanics.
2	Some development of thesis, some detail. Fair organization. Adequate word choice and constructions. Occasional errors in mechanics.
3	Little development of thesis, little detail. Little connection but still directed in pattern. Limited word choice and constructions. Frequent errors.
4	Little development of thesis, no detail. Less connection, no apparent direction in pattern. Poor word choice and constructions. Overabundance of errors in mechanics.
5	No development of thesis, no detail. Disconnected and confused. Lacks vocabulary, underdeveloped constructions. Lacks knowledge of conventions.
6	No thesis, off-the-topic papers. Fails to meet minimal standards of organization Fails to meet minimal standards of expression. Fails to meet minimal standards of correctness.

AD-A170 835 VOICE SYNTHESIZATION AS A TOOL TO ENHANCE REVISION DURING THE WRITING PROCESS(U) ARMY MILITARY PERSONNEL CENTER ALEXANDRIA VA W P HOWLETT 26 JUL 86 2/2

UNCLASSIFIED F/G 5/9 NL


1·0
1·1
1·25
1·4
1·6
1·8
2·0
2·2
2·5
2·8
3·15
3·5
4·0
4·5

APPENDIX B: HUMAN SUBJECTS APPROVAL FORM

INFORMATION ON THE USE OF HUMAN SUBJECTS IN RESEARCH
IOWA STATE UNIVERSITY
(Please follow the accompanying instructions for completing this form.)

1. Title of project (please type): [illegible] Effectiveness of Voice Synthesis [illegible] Model to Enhance Revision During the Writing Process

2. I agree to provide the proper surveillance of this project to insure that the rights and welfare of the human subjects are properly protected. Additions to or changes in procedures affecting the subjects after the project has been approved will be submitted to the committee for review.

Typed Named of Principal Investigator	Date	Signature of Principal Investigator
William P. Howlett	1/1[illegible]/86	[illegible]

Campus Address	Campus Telephone
[illegible] Quadrangle	294-[illegible]

3. Signatures of others (if any)

Signatures of others (if any)	Date	Relationship to Principal Investigator
[illegible]	[illegible]	Major [illegible]

4. ATTACH an additional page(s) (A) describing your proposed research and (B) the subjects to be used, (C) indicating any risks or discomforts to the subjects, and (D) covering any topics checked below. CHECK all boxes applicable.

- ☐ Medical clearance necessary before subjects can participate
- ☐ Samples (blood, tissue, etc.) from subjects
- ☐ Administration of substances (foods, drugs, etc.) to subjects
- ☐ Physical exercise or conditioning for subjects
- ☐ Deception of subjects
- ☐ Subjects under 14 years of age and(or) ☐ Subjects 14-17 years of age
- ☐ Subjects in institutions
- ☐ Research must be approved by another institution or agency

5. ATTACH an example of the material to be used to obtain informed consent and CHECK which type will be used.

- ☒ Signed informed consent will be obtained.
- ☐ Modified informed consent will be obtained.

6. Anticipated date on which subjects will be first contacted: Month 2 Day 7 Year 86

Anticipated date for last contact with subjects: Month 2 Day 21 Year 86

7. If Applicable: Anticipated date on which audio or visual tapes will be erased and(or) identifiers will be removed from completed survey instruments: Month ___ Day ___ Year ___

8. Signature of Head or Chairperson: [signature] Date: 1/8/86 Department or Administrative Unit: [signature]

9. Decision of the University Committee on the Use of Human Subjects in Research:

☐ Project Approved ☐ Project not approved ☐ No action required

George G. Karas
Name of Committee Vice-Chairperson Date Signature of Committee Chairperson

APPENDIX C: LETTER OF CONSENT

Iowa State University of Science and Technology
Ames, Iowa 50011

Dr. Ann Thompson
Secondary Education
College of Education
N165D Quadrangle
Telephone 515-294-5287

January 13, 1986

Dear Cadet:

During the period of February 7 - February 21, you will receive writing instruction utilizing a word processing system. You will be issued a blank computer floppy disk and a suitable amount of paper to fulfill the assignment. There will be absolutely no cost to you. Any instruction will be given to you at the Macintosh Laboratory in the basement of the College of Education (See attached) during times most convenient to your schedule.

After receiving instruction on a word processing system, you will be required to submit three drafts of your biography required for Summer Camp. These drafts will be codified to protect your identity and evaluated by professional readers from the Iowa State English Department. The resulting data will be used in my thesis work.

If you would prefer that your data not be included in my data analysis, please check the appropriate comment below and sign your name next to it. If I may use your data, please check the appropriate comment and sign your name next to it. Remember, whether your data is used or not, you will be required to complete the assignment for ROTC grade.

Sincerely,

W.P. Howlett, 2Lt, USA
Research Assistant

Ann D. Thompson
Associate Professor

Yes, you may use my data in your research._____

No, please don't use my data in your research._____

APPENDIX D: LESSON PLAN - WORD PROCESSING INTRODUCTION

Lesson Plan - Word Processing Introduction

1. Have subjects boot MacWrite Tour disk.

2. Introduce key concepts of using the Mouse:
   Tall faces north
   Click and drag

3. Open "Work with MacWrite."

4. Explain Icon, Menus, and Scroll Bar.

5. Allow subjects to work through "Guided Tour" - 25 minutes.

6. Demonstrate how to load paper into the printer.

7. Collect assignment sample file onto screen.

8. Save file on data disk.

9. Load file from data disk.

10. Print file.

11. Explain how disks are shared and check in procedures of the computer laboratory.

12. All drafts must contain subject ID number, followed by the number of the draft in the heading.

APPENDIX E: ASSIGNMENT WORKSHEET

Assignment

Remember to write in the third person, avoid using the pronouns I and me. Write your own 250 to 300 word biography to be used by the Public Afairs Office at Advanced Camp. Your biography should include all the stuff about yourself that you feel others would want to no.

****

Exercise: Collect (type in) the above paragraph on the word processor. After you have finished collecting the text, make the following corrections:

1. Move the first sentence to the end of the paragraph.
2. Add an f to Afairs so that it reads Affairs.
3. Replace the word "stuff" with facts.
4. Change the word "no" to know.

After making the above corrections, save the file to your data disk, move to a computer with a printer attached, load your paper into the printer, load your file into the word processor, and print out your corrected paragraph. This paragraph will also serve as your assignment sheet.

APPENDIX F: LESSON PLAN - TREATMENT INTRODUCTION

Lesson Plan - Introduction of Treatment

Treatment Group:

1. Boot "SmoothTalker" voice synthesizer.

2. Load previously saved file from data disk.

3. Explain menu selections necessary to have "SmoothTalker" read the file aloud.

4. Show similarities of editing features between "SmoothTalker" and "MacWrite."

5. Demonstrate use of headphone with "SmoothTalker."

6. Work through writing exercise.

Treatment and Control Group Writing Exercise:

1. Boot "MacWrite" or "SmoothTalker."

2. Have subjects turn off their monitors.

3. Explain to subjects invisible writing procedures:

    a. Don't worry about grammar or spelling.

    b. Don't turn on monitor until the end of the exercise.

    c. Concentrate on what you are writing.

4. Give subjects the opening statement, the Colonel said; "Take the hill!" and I, as a Second Lieutenant, said....." Now complete the story.

5. Allow the subjects to write for five minutes.

6. Instruct subjects to turn their monitors back on.

7. Edit document - 15 minutes.

8. Introduce concept of dual mode writing:

    a. Switch keyboards with your neighbor, keeping the keyboard connected to your computer.

b. Think of the Army branch that you would like to be in. You will have five minutes to convince your neighbor that he/she should also request that branch.

c. You may not speak to each other, all communication is to be accomplished via the computer.

d. If a receiver does not understand what is being sent, type in a question mark. The sender will then attempt to clarify.

e. If a sender loses his/her train of thought, type in an exclamation point. The receiver will provide written assistance to get the sender back on track.

f. Commence the exercise - five minutes.

g. Switch the senders and receivers.

f. Commence the exercise - five minutes.

i. Allow subjects to edit their messages.

END

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